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None

(58) Field of search

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B8P

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886D

(54) Security containers or enclosures

(57) A security system for detecting tampering with or entry into containers or enclosures comprises a container 1 in which a part of the surface of the container 1 is coated with a paint 3 having magnetic particles associated therewith. The paint 3 covers the boundary between the container 1 and a panel 2 of the container. If an attempt is made to gain access to the container 1 by removal of the panel 2, the magnetic particles, which due to the fact that the paint 3 has dried are fixed into a stable pattern, are disturbed and so the pattern is changed. By initially recording the pattern of magnetic particles immediately after the paint has set, and then subsequently inspecting and comparing the initially recorded pattern it is possible to determine whether or not the container 1 has been tampered with or entered into.

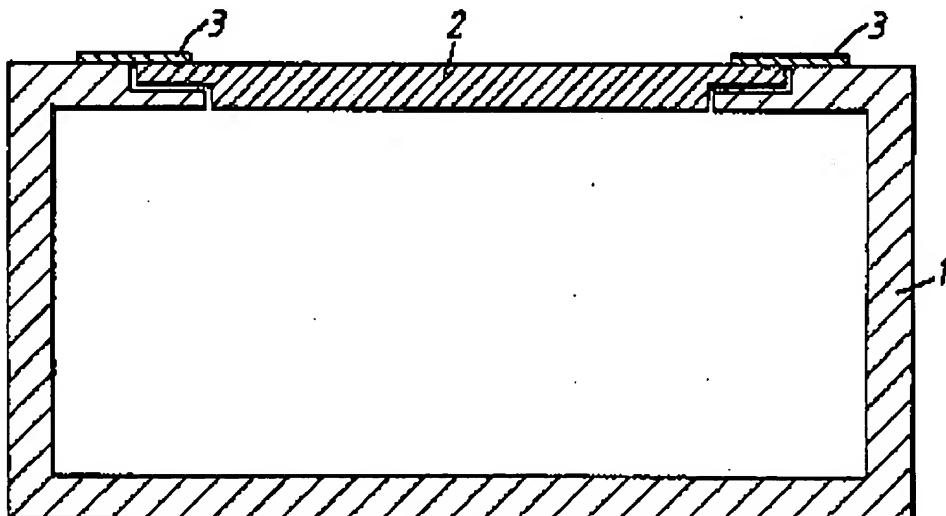


FIG. 1.

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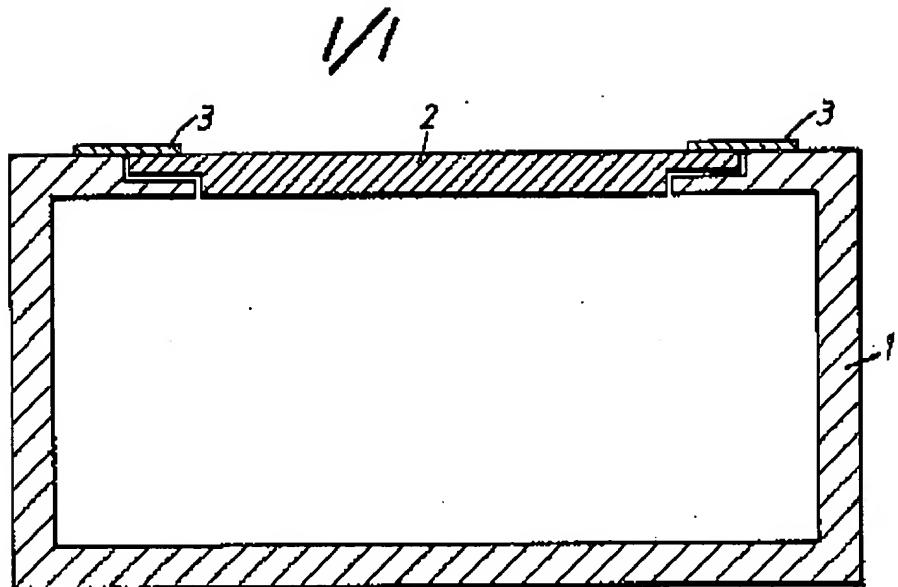


FIG.1.

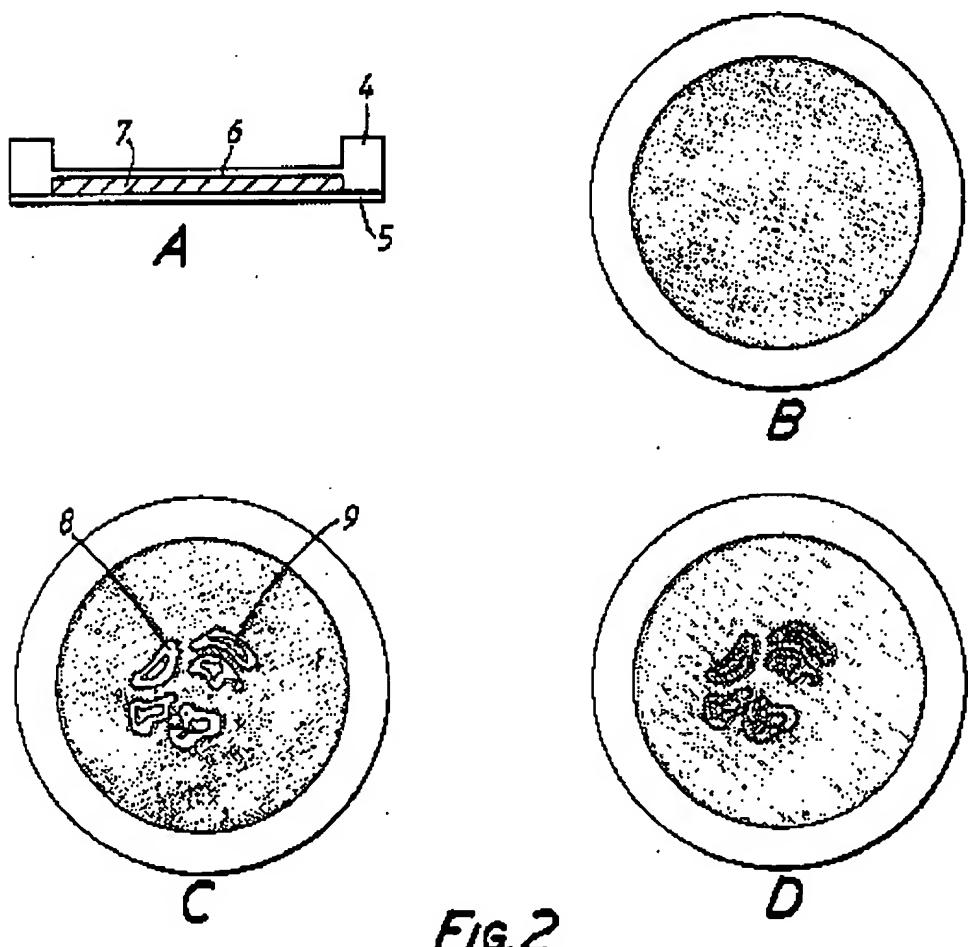


FIG.2.

SPECIFICATION**Security systems**

5 This invention relates to security systems, and in particular to systems for detecting tampering with/or entry into containers or enclosures.

A previously proposed system for detecting 10 tampering with or entry into a container or a enclosure includes the use of, for example, lead or wax seals which have to be broken in order for access to be gained.

Such a system has the disadvantage that it 15 is relatively simple to reproduce the seal and to reseal the container or enclosure thereby making it difficult for the entry subsequently to be detected.

Another previously proposed system involves 20 the use of holographic techniques, but such techniques are extremely complex to develop and implement and expensive to use.

The present invention is directed to a security system which is relatively simple, convenient and inexpensive to implement and which provides a security system which is difficult or impossible to forge or imitate after access has been gained to the container or enclosure.

According to the present invention there is 30 provided a security system comprising a container or enclosure in which at least a part of the surface of the container or enclosure, in one or more regions where physical tampering with or entry into the container or enclosure 35 may take place, is covered with a medium having magnetic particles associated therewith, wherein the medium constrains the magnetic particles in a stable pattern so that a further pattern dependent upon the arrangement of 40 the magnetic particles can be initially recorded and then subsequently inspected and compared with the initially recorded pattern in order to determine whether the container or the enclosure has been tampered with or entered 45 into.

The medium preferably includes the magnetic particles.

Recording the further pattern may be achieved by positioning a sensor cell, comprising 50 a suspension of magnetic particles in a liquid, over the medium, the further pattern being produced within the cell due to the magnetic particles of the cell becoming arranged in dependence upon the magnetic field 55 associated with the magnetic particles of the medium, and producing an image on a film, the image corresponding to the further pattern.

The image produced on the film is preferably 60 such that the cell and the film appear substantially opaque when viewed in alignment in the case where the pattern of the magnetic particles of the medium has not changed, and does not appear opaque in the case where 65 the pattern has changed.

Security systems according to the present invention are advantageous in that they render it very difficult or impossible for a person to gain access to the interior of a container or enclosure without revealing the fact that the access has been gained.

Further, such systems provide for the protection of computer data or firmware whereby security checks can be carried out relatively quickly and frequently by unskilled personnel, and apparatus required for the recording and subsequent inspection of the pattern corresponding to the magnetic particles is simple and cheap to produce.

80 The invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a cross-sectional view of a container partly covered with a medium comprising magnetic particles; and

Figure 2 shows several views of a sensor cell.

Fig. 1 shows a container 1 having a panel 2 which can be fixed to the container 1 by fixing screws (not shown). A medium, for example a paint 3 comprising magnetic particles is painted over an area covering the boundary of the panel 2 and the container 1. The magnetic particles may include hard and/or soft magnetic particles. Once the paint 3 has dried, the magnetic particles form a random pattern which becomes set or fixed due to the hardening of the paint. The magnetic particles are preferably small and large in number and hence form a pattern which is virtually impossible to reconstruct once the paint 3 is broken or disturbed. Hence, if a person tempts with or attempts to remove the panel 2, then the paint 3 would become damaged particularly at the container 1/panel 2 boundary and consequently the pattern of magnetic particles would change.

As an alternative to the medium being in the form of a paint comprising magnetic particles, the medium may instead be an adhesive tape having magnetic particles therein or the medium may be an epoxy resin which is poured over magnetic particles.

In order to detect whether the pattern of the magnetic particles has been disturbed, it is necessary initially to record a further pattern which corresponds to the pattern of the magnetic particles in the medium when the paint has dried or when the adhesive tape has been placed into position.

The further pattern may be recorded with the aid of a sensor cell in the form of a magnetic reader, which may be a suitably adapted form of the reader described in United States patent specification No. 3,013,208 (R.J. Youngquist et al).

Fig. 2A shows a side view of a sensor cell which may be used for recording the pattern of the magnetic particles. The sensor cell 130 comprises a housing 4 mounted on a trans-

sparent plate 6, a window 8, and a cavity 7. The cavity 7 contains a suspension, in a transparent liquid, of visible weakly ferromagnetic crystals which orient or spatially distribute

5 when placed in a magnetic field. When the sensor cell is viewed from above, the crystals can be seen through the window 8 and are randomly orientated in the absence of any magnetic fields and so they appear uniformly distributed over the volume of the cavity 7 as indicated in Fig. 2B.

When the sensor cell is placed on the paint 3, the magnetic field associated with the magnetic particles causes the spatial distribution 15 of the crystals to change and form the further pattern which corresponds to the pattern of the magnetic particles of the paint 3. The further pattern comprises regions 8 of low density crystals and regions 9 of high density

20 crystals (see Fig. 2C). The further pattern may be recorded by placing a photographic film (not shown) between the transparent base 5 and the paint 3, and then exposing, developing and fixing the film. The film will darken as 25 a result of the exposure in the regions 8 where the density of crystals is reduced and it will not darken in the regions 9 where the density of the crystals is increased. Hence a permanent record of the further pattern corresponding to the pattern of the magnetic particles is obtained. The position and orientation of the film relative to the paint 3 is recorded so that the film can be replaced for subsequent inspections.

35 In order subsequently to inspect the further pattern so as to check whether or not the paint 3 has been disturbed, the film is placed over the paint 3 in the same position and orientation as the initial recording was taken.

40 The sensor cell is placed over the film and if the paint 3 has not been disturbed the further pattern remains unchanged and so the exposed area of film will correspond with the regions 8 and the unexposed area of film will

45 correspond with the regions 9. Hence, when the sensor cell is viewed from above, the view will be substantially uniformly dark as indicated in Fig. 2D. If the magnetic particles of the paint 3 have been disturbed, and as a 50 result they form a different pattern, then the further pattern which corresponds to the different pattern produced in the sensor cell will not correspond to the pattern recorded on the film. Hence, when the sensor cell and the film are viewed together, the view will be a mixture of those illustrated in Figs. 2C and 2D that is, not substantially uniformly dark.

In the case where the paint 3 comprises soft magnetic particles, the initial pattern may 55 be influenced by a permanent magnet. The same influence should preferably be applied each time the pattern is inspected.

talner or enclosure in which at least a part of the surface of the container or enclosure, in one or more regions where physical tampering with or entry into the container or enclosure

70 may take place, is covered with a medium having magnetic particles associated therewith, wherein the medium conceals the magnetic particles in a stable pattern so that a further pattern dependent upon the arrangement of

75 the magnetic particles can be initially recorded and then subsequently inspected and compared with the initially recorded pattern in order to determine whether the container or the enclosure has been tampered with or entered into.

80 2. A security system according to claim 1, wherein the medium includes the magnetic particles.

85 3. A security system according to claim 1 or claim 2, wherein recording the further pattern is achieved by positioning a sensor cell, comprising a suspension of magnetic particles in a liquid, over the medium, the further pattern being produced within the cell due to the

90 magnetic particles of the cell becoming arranged in dependence upon the magnetic field associated with the magnetic particles of the medium, and producing an image on a film, the image corresponding to the further pattern.

95 4. A security system according to claim 3, wherein the image produced on the film is such that the cell and the film appear substantially opaque when viewed in alignment in the case where the pattern of the magnetic particles of the medium has not changed, and does not appear substantially opaque in the case where the pattern has changed.

100 5. A security system substantially as described herein with reference to the accompanying drawing.

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CLAIMS

85 1. A security system 8/17/05, EAST Version: 2.0.1.4